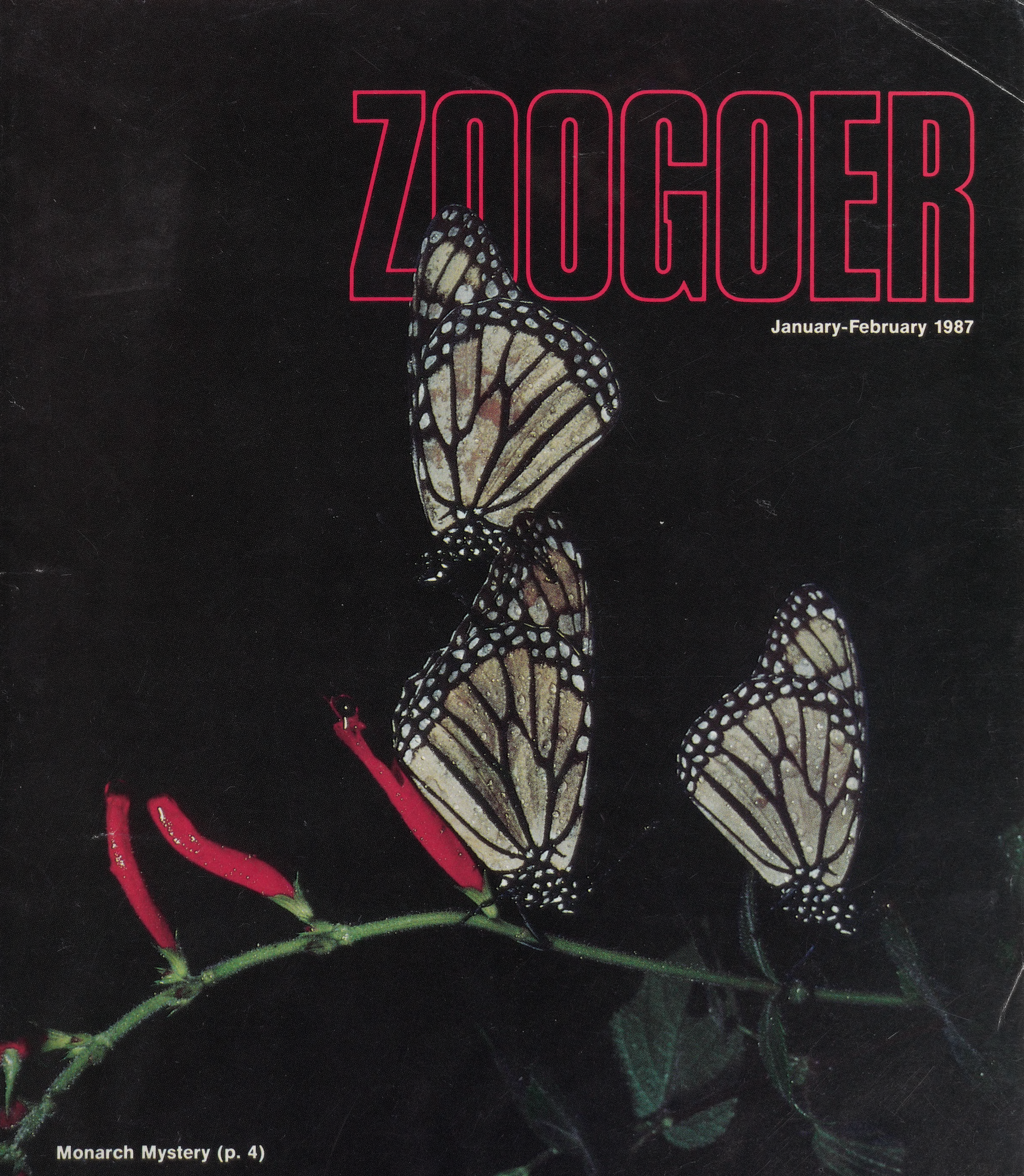
ZOOGOER

January-February 1987



Monarch Mystery (p. 4)

A.D.O.P.T.

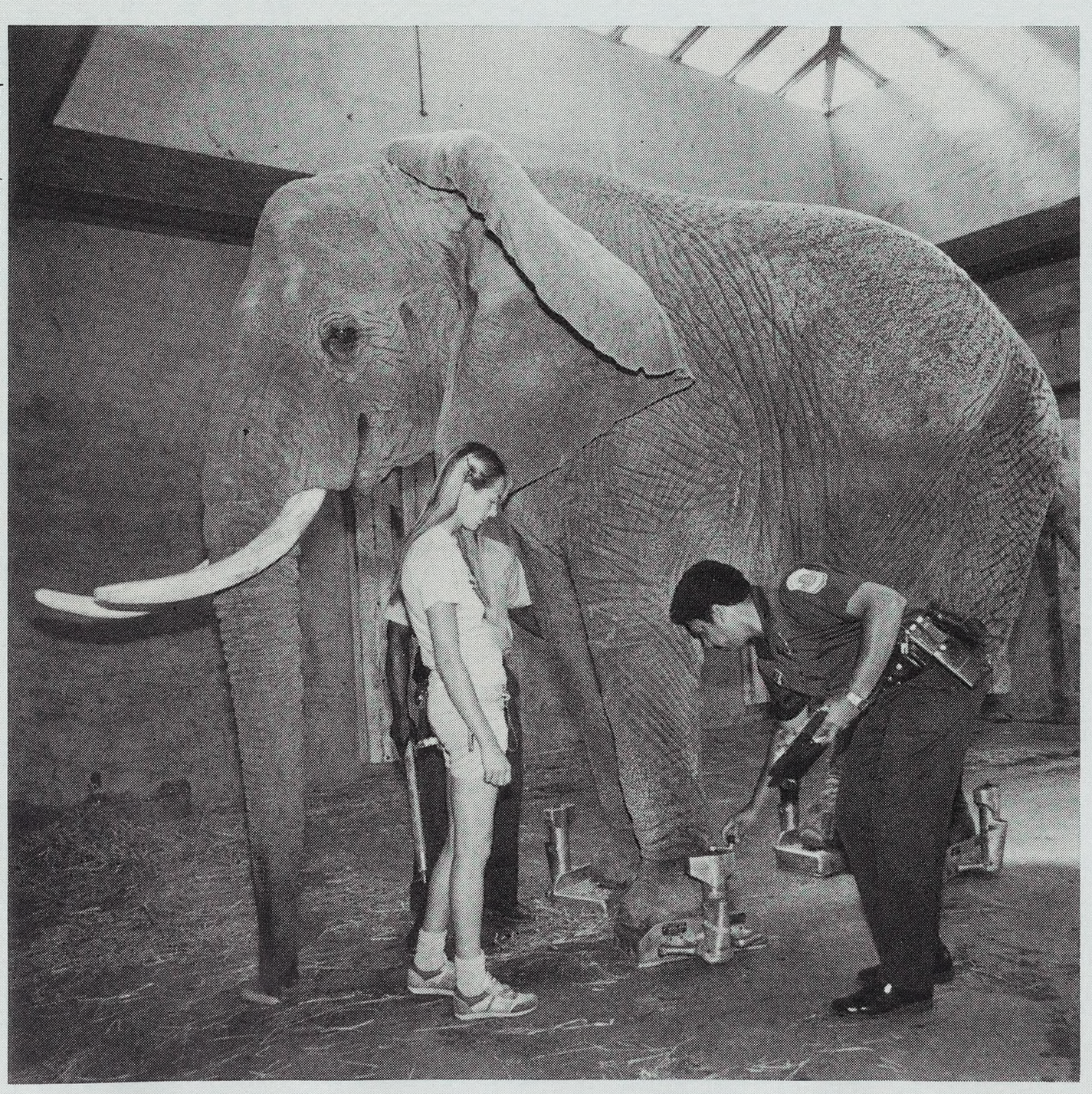
If your condo or classroom is too small to hold an elephant of your own, you can help support one in style through FONZ's new A.D.O.P.T. (Animals Depend on People Too) program.

You can select your A.D.O.P.T.ee from a wide range of species, from boa constrictors to macaques, flamingos to tarantulas. The support fee, which ranges from $15 for a giant cockroach to $5,000 for a giant panda ("shares" are available for the species that cost more to exhibit), will go toward the care of all Zoo species.

A.D.O.P.T. funds will be used to provide "extras" that enhance the day-to-day lives and maintenance of the animals. Following a flood of holiday A.D.O.P.T. gifts, in which timber wolves and prairie dogs proved the A.D.O.P.T.ees of choice, Zoo officials will soon make the first major expenditure of A.D.O.P.T. funds. A likely first purchase is a set of elephant-sized scales on which large animals can be regularly weighed. At present, truck scales must be borrowed from local highway departments for periodic weigh-ins. Down the line, A.D.O.P.T. may help fund the renovation of the bald eagle exhibit, develop a new exhibit for Guam rails and Micronesian kingfishers, and provide shade trees, rocks, and waterfalls to enrich outdoor primate yards.

For more information, and to order your A.D.O.P.T. "papers," call 673-4637.

Jessie Cohen, NZP Graphics



The Zoo's elephants are currently weighed on scales borrowed from area highway departments, but they may soon get scales of their own through the A.D.O.P.T. program.

Friends of the National Zoo is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the National Zoological Park as one of the world's great zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

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The National Zoological Park is located in the 3000 block of Connecticut Avenue, N.W., Washington, D.C. 20008, (202) 673-4717. Weather permitting, the Zoo is open every day except Christmas. Hours: From May 1 through September 15, grounds are open 8 a.m. to 8 p.m.; buildings, 9 a.m. to 6 p.m. From September 16 through April 30, grounds are open 8 a.m. to 6 p.m.; buildings, 9 a.m. to 4:30 p.m.

***ZooGoer* staff:** *Editor:* Bettina Conner; *Assistant Editor:* Susan Weinberg. **Contributing Editor:** Susan Lumpkin. **Consulting Editors this issue:** Judith Block, Edwin Gould, Robert Hoage, Olav Oftedal, John Seidensticker, William Xanten.

Cover: Monarch butterflies at their winter home on a Mexican mountainside. This summer, NZP expects to attract scores of these beautiful insects to the Zoo. Photo by William H. Calvert. *Back cover:* A male timber wolf at the National Zoo. Photo by Jessie Cohen, NZP Graphics.

Membership in FONZ entitles you and your family to many benefits—publications, discount privileges, and invitations to special programs and activities to make your zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, Washington, D.C. 20008, or call (202) 673-4960.

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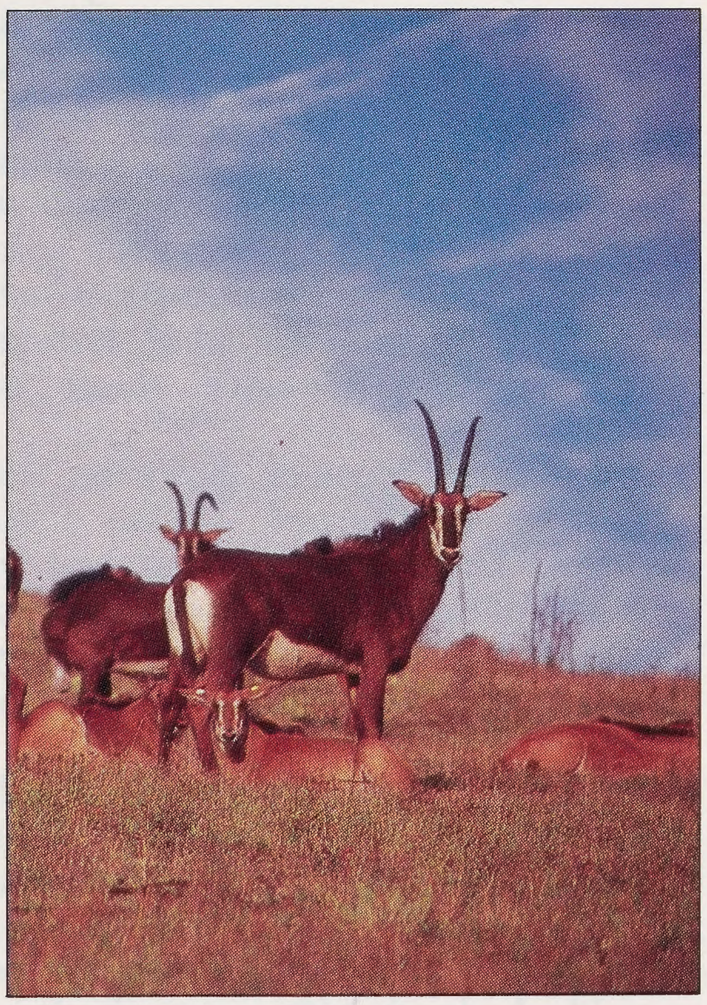
Junior (3-16 years)	$15
Contributing	$50
Sustaining	$125
Patron	$250
ZooGoer subscription only	$7.50

Monarch butterflies (p. 4)



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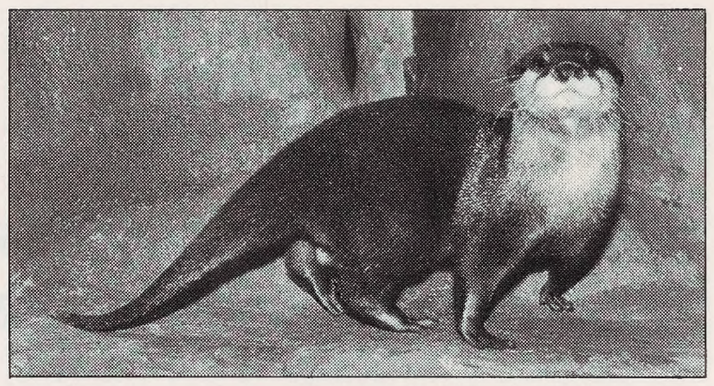

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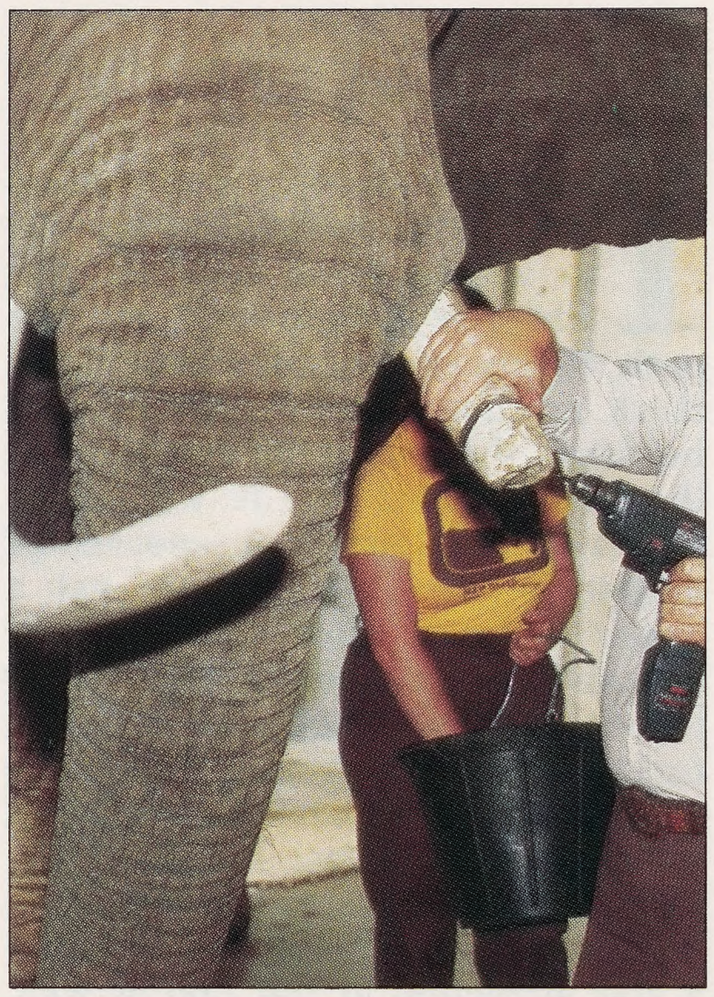

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Monarch Mystery

For years, scientists watched in frustration as huge clouds of monarch butterflies seemed to vanish into thin air.

Marcy Lawton

I waited for the group of visitors at the National Zoo's zebra yard to wander away. As the last straggler disappeared up the path, I glanced around, then quickly stuck my head into the weeds that bordered the enclosure. Beautiful as the zebra might be, it was those plants—bloodflowers, a species of milkweed—that I wanted to get a closer look at. Sure enough, after checking the undersides of about 50 leaves, I found what I was looking for—the tiny, pale green, globular egg of the monarch (*Danaus plexippus*), an insect that is fast becoming the superstar of American butterflies.

This butterfly should soon become a star attraction at the Zoo as well, when a horticultural experiment designed to draw some of the more gorgeous insect species to banks of native plants gets underway this spring. Butterfly weed, a member of the milkweed family, serves as a combination nursery and larder for developing monarch eggs and caterpillars so Zoo horticulturists and FONZ volunteers will be planting and tending "magnetic" beds of butterfly weed in various locations around the Park.

The relationship between monarchs and milkweeds first caught the attention of biologists about 20 years ago when University of Florida zoologist Lincoln Brower demonstrated that the monarch's bold orange-and-black color pattern may act as a warning signal to potential predators. In a series of now classic experiments, Brower and his colleagues found that monarchs are both distasteful and toxic to many birds. It seems that the monarch's secret weapon is rooted in the milkweed.

Hatching three to 12 days after the eggs are deposited on the underside of a milkweed leaf, the boldly striped black, white, and yellow monarch caterpillars spend about three weeks grazing on their plant hosts. As efficient as they are voracious, the caterpillars grow so fast that they must shed their skins five times to accommodate a nearly 3000-fold weight gain during that three-week period.

Along with carbohydrates, an important component of the caterpillar's leafy diet is plant poisons, which are later dispersed in the butterfly's black and orange wings. It is those poisons that give a hungry bird the surprise of a lifetime—and that's how long it lasts. Not even a seasoned biologist can persuade most birds to sample a second monarch.

Monarchs need this protection from predators because, unlike most other butterfly species, they are great wanderers. Building their numbers in one area during the long, warm days of summer, the monarchs become restless as the days grow short and temperatures drop. Come fall, groups of butterflies gather at rich nectar sources and, as their numbers swell, begin to roost together in temporary nighttime clusters. Finally, driven by environmental cues scientists are still trying to puzzle out, the monarchs begin an incredible journey south.

All across the continent, monarchs glide into flight, traveling as far as 60 miles in a single day. Late September through early October finds monarch streams meandering across the Cumberland Plateau, while along the Gulf Coast of Florida, the monarchs swirl and eddy. Never appearing to hurry, but always moving south, the butterflies float by for weeks.

The reason behind this exodus has long been clear: At no stage in their complex life-history can monarchs survive prolonged freezing temperatures. Unlike many temperate zone insects, monarchs can neither burrow into the ground nor pack their eggs into cold storage units, as praying mantids do. Monarch survival depends on their escaping the harsh North American winters.

For Western monarchs, this means seeking refuge in the warm coastal valleys of California, where they pass the winter in clustered colonies. Unfortunately, these areas, which range from Monterey to Los Angeles, have recently become the focus of controversy as conservationists clash with developers who want human aggregations to replace those of butterflies.

East of the Rockies, however, the situation is different. Unlike their Western kin, butterflies hatched in this part of the continent do not winter in the United States. Just where they do winter was, until quite recently, a mystery.

For many years, frustrated North American scientists spent their autumns watching the monarchs stream along the Gulf Coast of Texas and Florida—only to see the orange and black cloud drift across the border and vanish into thin air somewhere over Mexico.

As long ago as 1937, Canadian zoologist Fred Urquhart began trying to trace the tracks of the migrating monarchs. Tagging thousands upon thousands of individuals each year, it was he who discovered that Western monarchs go to California. Thirty-eight long years later, he solved the riddle of the Eastern monarchs' destination as well.

In 1974, following several fruitless attempts to find the monarchs' wintering ground on his own, Urquhart placed ads in the Mexico City newspapers asking for help. As it turned out, the people who could most easily have answered his questions don't generally take those papers.

The Mazahua and Tarascan Indians could have told Urquhart that those monarchs last seen streaming out of Canada and the United States ulti-

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Dr. Lawton is a visiting scholar at the University of Alabama in Huntsville.

mately become great rolling tides which come to rest on a few sheltered ridge crests in the mountainous state of Michoacan, Mexico. So faithfully do the monarchs return to these winter refuges that the Mazahua word for monarch means "butterfly that passes in October and November." Among the Tarascans, whose stories incorporate a fascinating blend of pre-Columbian and Christian images, the butterflies are said to be souls gathering for All Saints Day.

But Urquhart and his scientific colleagues were in luck. Intrigued by the newspaper ads, Kenneth and Cathy Brugger, two amateur naturalists living in Mexico City, began to comb the nearby mountains for monarchs. On January 9, 1975, the two explorers called Urquhart to report that they had found the monarchs—millions of them—in a tiny area about four hours north of Mexico City.

Delighted, Urquhart flew south at once and, a few months later, published news of the discovery in a scientific journal. Included in this report were descriptions of the colony's habitat and altitude, but maps and information detailing the whereabouts of the site were curiously absent. Concerned that a mass migration of biologists to the wintering grounds might endanger the butterfly population, Urquhart kept the location strictly secret. (As it turned out, the butterflies were in plenty of danger already from local wood cutters and cattlemen. For instance, until last year, when the Mexican government declared the butterfly colonies wildlife sanctuaries, farmers would frequently herd their cows into the colonies and shake roost trees until thousands of butterflies fell to the ground for the cows to eat.)

What followed was a scientific quest with all the rivalry and excitement of the archaeological competition between Indiana Jones and Henri Beloch. Shortly after Urquhart's paper appeared, Lincoln Brower decided to ignore his Canadian colleague's exhortation to keep up his own good work on monarchs in Florida. Instead he bought his postdoctoral associate, William Calvert, a ticket to Mexico City. "Find the monarchs," Brower told Calvert.

Homing in on the site was not quite as impossible as it first sounded. "After all," Calvert recalled, "there just aren't that many peaks above 9000 feet in this part of the world."

Armed with a topographical map of the area, Calvert prepared to spend the early months of 1976 asking around the towns near the high peaks of Michoacan's Sierra Madre mountains. In fact, he hit the jackpot the first time out in an ancient silver-mining town called Angangueo.

As Calvert is the first to admit, he might well have had similar luck in any of nearly a dozen towns in that region. In fact, in the past decade Calvert and others have discovered at least 12 monarch colonies, all less than 20 acres in size, in Michoacan and northwestern Mexico.

So why do millions of monarchs

Volunteers are planting milkweed throughout the Zoo grounds, hoping to lure the "treasures of the Sierra Madre" to the Park this summer. (Illustration courtesy of U.S. Department of Agriculture.)

William Calvert

William Calvert

choose a particular peak on which to settle for the winter? No one knows—but the sites they do select are at least superficially similar. Butterfly colonies generally occur in stands of fir, pine, and cypress on the slopes of north-facing ridges, where the cool, moist climate protects the colony from dessication.

Of particular importance to the butterflies is the fir tree, known locally as "oyamel." In one colony, called La Chinqua, the monarchs roost so densely on these trees that the trunks, branches, twigs, and needles are often completely obliterated. Individually light, the butterflies weigh enough collectively to bend branches almost to the breaking point.

If the boughs do break, or if loggers remove the trees altogether, the butterflies are in trouble. Once on the ground, the monarchs are vulnerable to freezing; if the temperature falls below 58°F, as it often does, the butterflies cannot return to the protection of their communal roost until temperatures rise again, usually about mid-day.

Both daily and seasonally, an increase in temperature brings on an increase in butterfly activity. Semi-dormant in the coldest weather, by January a fraction of the colony will be active at any given time. The rest hang motionless from the trees, conserving the fat stores that will fuel the long journey north.

Come April, millions of monarchs mobilize and, in a few short weeks, seek the nectar of mountain flowers, mate on the wing, and head north again. Most of the monarchs that winter in these high mountains never reach the fields where they hatched, but die along the way, first leaving their tiny green eggs to gleam from the undersides of milkweed plants. Then, in the lengthening days of spring, these eggs hatch and the next generation begins to eat, transform, and—following cues as yet known only to the monarchs—move on to the abundant nectaries of the North and the butterfly weed beds of the National Zoo. □

Top: A cloud of monarchs descends into a stand of trees in Northwestern Mexico. Left: Thickly clustered on fir boughs, the monarchs' weight bends branches almost to the breaking point.

Zoo Pathology: A Behind-the-Scenes Report

Richard Montali

A relatively recent entry in the field of zoo animal medicine, pathology is the study of the nature and effects of disease leading to important preventative measures and remedies. Anyone who saw the "Quincy" series on TV has a basic idea of the kind of scientific detective work involved. But while Dr. Quincy somehow always managed to pull out the right answer, in real life, quick medical solutions are not always as forthcoming. Yet, zoo pathologists do come up with answers that significantly contribute to our knowledge of the exotic animals in our care.

Take the case of Indah, one of our young orangutans. She was perfectly healthy at birth, but unfortunately her mother, Pensi, had a serious infection. Worried that this infection might be transmitted to the newborn through her mother's milk, we decided to remove Indah to an incubator at birth. In September 1980, at the age of one month, Indah was sent to the San Diego Zoo's hand-rearing facility where she could be raised in the company of other young orangs. There, despite excellent care, she eventually developed diarrhea, weight loss, a low protein level, and leukocytosis, which is a high white blood cell count that usually indicates infection. A certain kind of blood cell, called an eosinophil, that sometimes indicates an allergy was also elevated.

Still the problem could not really be pinned down, so in February 1984, Indah came back to us. We repeated many of the same tests to no avail. Eventually, our clinical staff decided to biopsy her intestine, assisted by William Ravich, a gastroenterologist from Johns Hopkins. (We frequently consult experts from human medicine, particularly over a primate that's as closely related to people as an orangutan.) I examined the biopsy under the microscope, and it turned out that those eosinophils were in fact the key. The diagnosis was eosinphilic enterocolitis, meaning that an infiltration of these cells was interfering with the proper working of the digestive tract. A similar condition that occurs in humans responds well to treatment with prednisolone, a type of cortisone, so Indah was put on this regime and her diet was adjusted. She soon blossomed, and within a month she had become a totally different animal.

Indah is one of our definite success stories—the type of thing that makes our work exciting.

Pathology Spectrum

Many people think that a pathologist does nothing but dissect dead animals from nine to five—a dismaying idea to those who shuddered through high school biology. On the contrary, the day-to-day operations of our department run the gamut from health screening of live animals to autopsies, with plenty of research into effective treatments and vaccines along the way.

We monitor our animals' health from every angle, right from the start, screening new arrivals which are quarantined up to a month before they go on display so we can check their general condition and head off any potential threat from disease or parasites. Once animals go on exhibit, we regularly run routine tests on them to detect any developing medical problems. These lab tests can sometimes speak volumes, because animals often mask symptoms of illness as a survival mechanism.

While many of our tests duplicate those performed in hospitals and veterinary clinics, the unique nature of the Zoo's clientele requires that we do most of the lab work in-house, rather than sending samples to an outside laboratory for analysis. After all, when you're dealing with mammals that range from a gorilla to a zorilla, to say nothing of birds and reptiles, the modifications of even standard procedures are endless. Running a blood count on a bird, for example, is completely different from doing one on a human being or even a domestic animal; the concept is similar but the cells are completely different.

In our other major function—conducting autopsies—we systematically dissect every Zoo animal that dies, from an egg that fails to hatch to a geriatric tortoise, to discover the cause of death. At the same time, we try to learn as much about that animal as possible, making sure there are no hidden problems with its diet, environment, or management that might also be affecting its colony mates.

While we deal with a variety of ailments, people are often surprised to learn that most of the diseases we encounter are often the same viruses and bacteria that afflict domestic animals. However, that in itself can cause a lot of uncertainties, because different animals may adapt to a disease differently.

Panda Crisis

Where does the pathology program fit into Zoo operations? Clinical veterinarian Mitchell Bush makes the medical decisions and he or his staff treat the animals, while we provide the diagnostic support. For instance, in 1984, when Ling-Ling was struck with kidney problems, my team of lab technicians and I were called into action. Decisions had to be made in a matter of minutes, so as soon as the panda was sedated, we began blood tests using portable equipment right at cageside to determine and monitor her condition. A kidney biopsy subsequently showed that her condition

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Dr. Montali heads the National Zoo's Department of Pathology. He spoke about zoo pathology during the Sixth National Zoological Park Symposium for the Public in October 1986.

Jessie Cohen, NZP Graphics

Milton Tierney

would be treatable with antibiotics. The crisis, which lasted several days, proved the value of the Zoo's well-equipped laboratory: If we'd had to rely on an outside lab, who knows when we would have had the answers?

People often ask me what most zoo animals die from. Of course it's impossible to come up with a single answer to that question when you realize that we're dealing with 450 different species, with life expectancies ranging anywhere from two years in the smaller mammals, like rodents, all the way past the century mark in the great reptiles. However, many zoo health problems stem either from infectious diseases brought in by outside, non-zoo animals, or from too little information about the specific needs of an animal in captivity.

These management-related problems may take some time to track down, but often clear up once the appropriate adjustment is made in the animal's environment or diet. The case of Gunar, the gray seal, is a good example. Several years ago, he and some of the other gray seals developed odd white plaques on their heads and flippers. We diagnosed it as a fungal infection, yet none of the antifungal drugs or therapies we tried had any lasting effect. It soon became obvious that the problem was cyclic, fluctuating with the temperature of the seals' pool: When the water reached 80 degrees or above, this fungal disease would be at its worst, but once we realized that the causative factor was related to the water temperature, we didn't have to do anything more, medically speaking. Instead, we had the troublesome water cooling system "operated on" and Gunar's lesions cleared up.

With diet-related problems, we have also often learned by experience. For example, brown pelicans in the wild live on fresh fish. In the Zoo they're fed frozen fish; but it turns out that with time two vital nutrients in that fish—Vitamin E and selenium—often become lost. When these substances are depleted, the birds develop serious muscle problems, so we've found that a key aspect of keeping pelicans and other fish-eating birds and animals in captivity is supplementing their diet with extra Vitamin E and selenium.

Uninvited Guests

Diseases brought in by outside animals are obviously the hardest to prevent and can arrive with frightening unpredictability. When I first came to the Zoo in 1975, I'd been here all of two weeks and was very pleased with the prospect of developing an ambitious pathology program. Then one Saturday morning, I got a phone call at home: Apparently the ducks were dying in droves. When I got to work, the staff was literally bringing in piles of dead ducks. I thought, "What have I gotten myself into? Maybe it's like this all the time!"

As it turned out, we were in the middle of a die-off from duck viral enteritis, a disease brought in by wild black ducks. (Some of the ducks in the Zoo's waterfowl ponds are actually free fliers that come in for a stopover or an easy winter.) With that diagnosis made, we rushed in and vaccinated the rest of the waterfowl in the collection. Once the crisis had passed, the outcome and the future seemed really promising. I felt for the first time that I could really make an important contribution to the Zoo's work.

Then, in the fall of 1984, I got another weekend morning phone call, and again the Zoo was experiencing a duck die-off, right in the same ponds. Not again, I thought, but this time the problem was due to botulism, which now and then will kill masses of wild ducks when it builds up in the sediment of a pond. In this case it was caused by the carcass of a wild duck that had become infested with maggots and washed into the pond, where the toxin spread.

The signs of this disease, aptly called "limber neck," are somewhat disconcerting. While the duck may look dead, it's actually paralyzed by the botulism toxin. It loses the use of its neck, which droops over; in the water, the duck would quickly drown. We lost about 20 of our own ducks and about 30 of the wild ones, but luckily we were able to save those birds that were still in the early stages by washing out their stomachs, injecting them with an antiserum, and by keeping them warm and supporting them.

These two die-offs occurred almost 10 years apart. While it's not a pace I could handle on a weekly basis, like "Quincy," it's always exciting to be able to make a diagnosis and then quickly run in and do something that helps the rest of the animals.

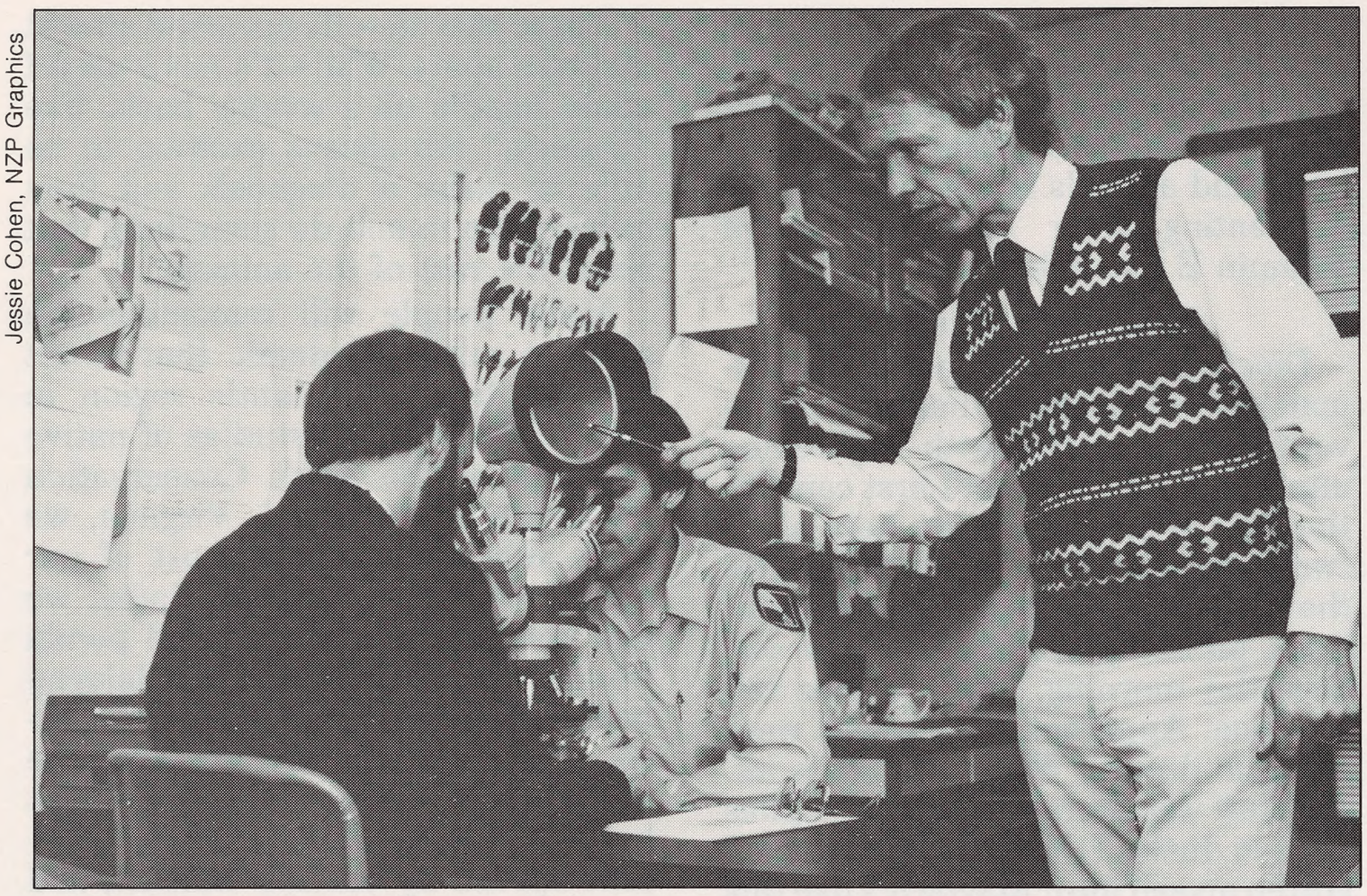
Many people will remember the raccoon rabies epidemic that swept through the mid-Atlantic region in 1983. Tipped off by studies of native raccoons at the Zoo's Conservation Center in Front Royal, Virginia, we were able to vaccinate most of our animal collection in time. Sadly, we had one death—a mother red panda whose booster shot had been delayed because her young cubs were at a critical age. Although the worst of the rabies epidemic is past, it points out how vulnerable our animals are to disease spread by outside animals, and how difficult it is sometimes to protect them.

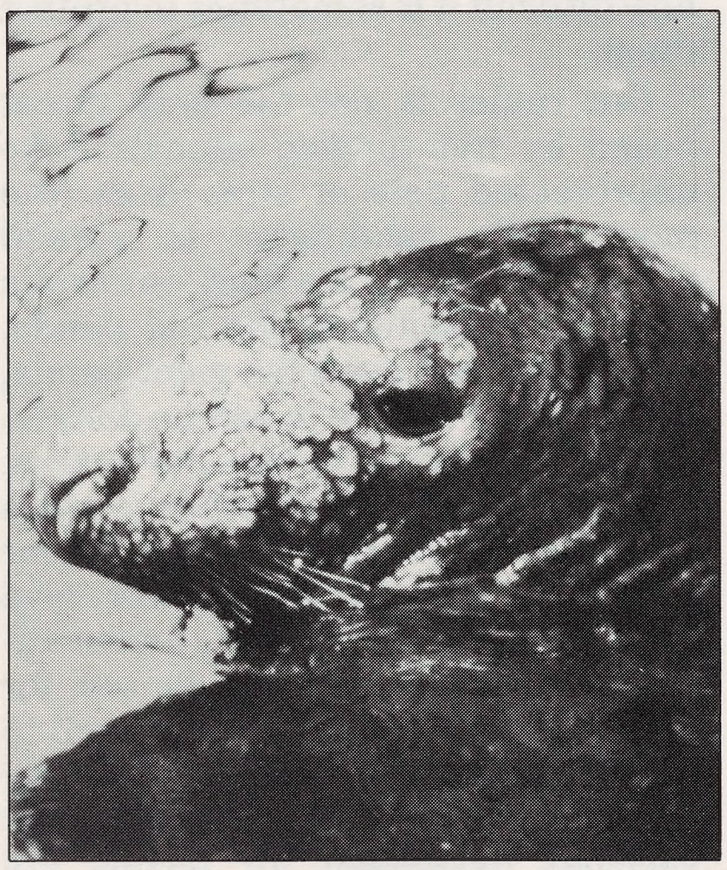
But rabies is not the only threat posed by free-ranging animals. Like unprotected pets or stray dogs (the most likely candidates to spread canine diseases at the Zoo), our exotic carnivores, including the red panda, fennec fox, and even the giant panda, are very susceptible to canine distemper, and the maned wolf to parvovirus. Yet trying to protect these exotics with a distemper vaccine designed for a dog, for example, will actually give them that disease! In fact, few medications are specifically adapted for zoo animals, so we are working hard to develop safe, effective vaccines for the animals in our care. Distemper vaccines developed for ferrets are now showing some promise; we're also working with the veterinary virologists at Cornell University who did the major research on canine distemper in dogs to refine a vaccine for the red and giant pandas.

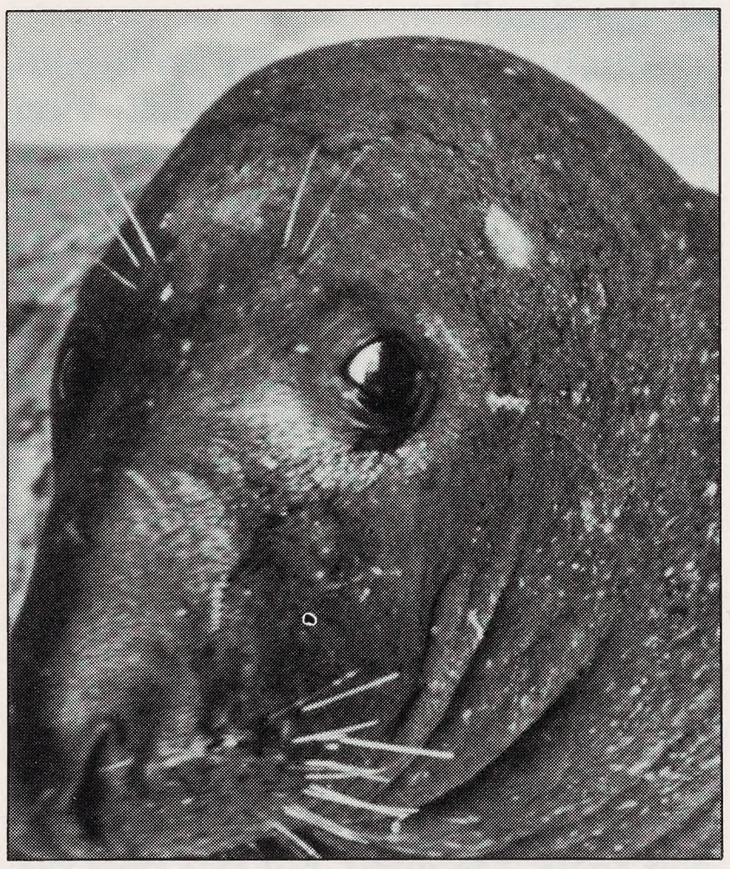
We are continuing to explore solutions to another important problem arising from contact with "outside" animals at the Zoo's Conservation and Research Center in Virginia. A major emphasis of CRC's work is large-scale breeding of exotic hoofed stock, so we became very worried in 1982 when we began to see problems with meningeal or brain worm, a parasite commonly found in the local white-tailed deer. The worm cycles harmlessly through the native deer, but when it gets into an exotic ungulate it burrows into the spinal cord with fatal results. We first experi-

Photos taken before (top left) and after (top right) Indah's diagnosis and treatment reveal a dramatic change. The young orangutan grew and gained weight, her coat appears thick and healthy—even her keeper Rob Shumaker looks happier! Left: Indah continues to thrive in her home at the Great Ape House.

Jessie Cohen, NZP Graphics







Daniel Anderson

enced problems in our reindeer herd; then, in 1984, we lost two female sable antelopes, a particularly unique and valuable species. Obviously, this one tiny worm could seriously limit CRC's important work with certain hoofed stock species.

There's really no cure once the parasite gets into the animal, so our first step was to double-fence the pastures to keep the white-tailed and exotic deer from mingling. But complicating the problem is the fact that the parasite is spread by an intermediate host—slugs and snails—and fences can't stop them. We're now controlling these gastropods by creating natural barriers by clearing vegetation from areas where the snails might otherwise cross into the fields, and by rotating resistant ungulate species into the high-risk pastures. Blood tests that can detect the infection caused by the parasites are also being investigated by our staff. We now have a better handle on the problem, but more research is clearly essential.

In a way, the Pathology Department's work is most satisfying when it is the least exciting—that is, when the Zoo's animals are healthy and thriving. Yet the final results of even routine work are rewarding indeed, for every bit of information gathered through day-to-day encounters with a variety of exotic species helps to expand the growing field of zoo pathology. We are one of only three full-time zoo pathology programs in the country, but our labs continue to accumulate virtual mountains of data which for the past 10 years have been entered into the Smithsonian's main frame computer. Such information helps us not only to track trends at the Zoo, but also to publish what we've learned and so share our unique experience with other zoos around the world. □

Top: The Pathology Department maintains a small but intensive program for graduate veterinarians. Here, Dr. Montali (right) uses a teaching microscope to illustrate a disease problem with resident Don Nichols (center) and intern Bruce Rideout (left). Center: A change in pool temperature led to the remission of gray seal Gunar's fungal disease. Left: Protecting the Zoo's rare hoofed stock from a fatal parasite is a top priority.

Exotic Infants

The National Zoo's Hand-Rearing Facility offers a last-resort lifeline to young exotic animals.

Sally Tongren

Curled upon a nest of toweling, a young cub snoozes in an open "den." The den is a cardboard box tipped on its side, the cub a 10-week-old maned wolf named Dana. As an adult, she will boast long, black-gloved legs and a rich russet coat, but for now her grayish-brown fuzz bears only the slightest hint of red. Her ears, which will always be large, are out of all proportion; when pricked with interest, they overshadow her small, foxy face. On this March day, she is the only inhabitant of the National Zoo's Hand-Rearing Facility. But early spring is prime time for animal births, so the situation could change overnight, with Dana taking a back seat to new Hand-Rearing arrivals.

While Dana is the only resident, the volunteers who staff the Facility work two shifts a week instead of the usual three. A few weeks earlier, when the cub was receiving five or six daily feedings, someone was in attendance round the clock. Now, she is old enough to be fed at midnight, then left alone to sleep until another volunteer arrives at 7:30 a.m.

Breakfast is the first concern on the morning shift. Carefully following the instructions on Dana's diet chart, the volunteer assembles precise amounts of cooked "carnivore diet," vitamins, and formula. She weighs and measures each portion before and after feeding the cub. The cub herself is also weighed, so there is a precise record of Dana's daily intake and rate of growth.

The morning feeding begins a busy 11-hour shift for the daytime volunteer, who must also scrub Dana's large enclosure with a cleaning solution and then hose it down, cook meat for the next feeding, prepare the day's supply of milk formula, and update records on Dana's growth, health, and behavior. During her "spare time," she cleans the Facility's big basement room, including a maze of overhead pipes.

Dana must also be given medication for a mild infection. Just as domesticated puppies are tempted into accepting capsules wrapped in raw hamburger, Dana receives hers wrapped in a defrosted mouse in hopes she will gulp this treat down without question. She does.

Veterinarians monitor the progress of the infection via urine specimens which volunteers collect from the floor with a syringe—a procedure Dana views with keen interest. As she bounds up with pattering paws and an inquisitive nose to investigate, a volunteer may wish for three or more hands—two to operate the syringe, and at least one to restrain a playful little wolf.

Volunteers play with Dana, throwing balls for her to chase and rubber rings for her to chew as they might for any puppy. But there is a difference. While Dana needs stimulation and exercise, she is not a pet to be cuddled. Dana is encouraged to direct her attention and interest to the toy objects—not to humans. She is not allowed to play tug-of-war or to chew on hands; in short, any behavior that would be undesirable in a grown wolf is nipped in the bud. In the same way, baby monkeys, no matter how appealing, are discouraged from jumping on or clinging to Hand-Rearing volunteers as this kind of play could be dangerous to keepers dealing with a grown monkey.

Tame as she is, Dana remains the cub of a wild species. She comes forward with interest to investigate a new visitor, but there is none of the bumbling enthusiasm one would expect of a domestic puppy. Rather, she shows a certain reserve. In fact, some maned wolf cubs never become very tame, but bristle their fur and bare their teeth even as youngsters.

Below: Maned wolf cub Dana is encouraged to play—but not with people. Overleaf: A volunteer bottle-feeds a Bengal tiger cub at the Zoo's Hand-Rearing Facility. (Photos by Jessie Cohen, NZP Graphics)

FONZ volunteer Sally Tongren has authored several books and articles on zoo animals.

The limited captive gene pool of a rare species like the maned wolf lends great importance to each individual's genetic contribution.

And this is as it should be. Young, hand-reared animals must return to live with their own species as soon as they are weaned or can be cared for by the keepers during normal working hours. Any attempt to make pets of them may interfere with their adaptation to others of their kind. Such social adaptation is critical: Zoos now rely on captive-bred animals to fill exhibits, and if all goes well, the hand-reared youngsters will not only survive but will become parents of another generation. Moreover, the limited captive gene pool of a rare species like the maned wolf lends great importance to each individual's genetic contribution.

Most animals that come to the Hand-Rearing Facility are infants whose mothers have failed to rear them. There are several reasons for maternal rejection. The mother may not be providing enough milk; she may be ill; occasionally, she may have died. The baby may be sickly and require intensive medical and nutritional care. Or the young animal might not respond properly to the mother, leading her to reject it. Even in the wild, animals that are giving birth for the first time may not be effective mothers.

Sometimes, maternal rejection is associated with captivity. Primates that have been hand-reared themselves may not have learned good infant care and thus fail at mothering. Lack of information on a species' natural rearing patterns may lead to such actions as removing the father when he should be part of the family or leaving him with the mother when he should be removed. Despite the great growth of knowledge of animal behavior, scientists still have much to learn in this area; even under the best circumstances, individual animals may exhibit abnormal behavior.

Occasionally, young deer and antelopes are hand-reared as a matter of management policy. This early acquaintance with humans makes these animals, whose every instinct tells them to flee from strangers, somewhat tamer as adults and less prone to sudden panics. Others are hand-reared so that, as adults, they will allow themselves to be handled by researchers involved in studies of reproductive biology.

The overall success rate in raising these babies is excellent, but it varies with the species. About 98 percent of all carnivores—red pandas, maned wolves, bush dogs, tigers, and such—are reared successfully. Hoofed animals also do well at around 78 percent. Primates usually thrive, but they can easily become socially maladjusted when hand-reared.

Oddly enough, rodents have been difficult to hand-rear. Their reputation for hardiness and prolific reproduction is not deserved by all members of this extremely large and diverse order, which ranges from 100-pound capybaras through beavers, squirrels, and porcupines to tiny harvest mice. There is little accurate information on the lactation and development of many of these species, with the result that hand-rearing of rodents has had a relatively poor success rate.

Marsupial Conundrum

Of all the creatures that come to the Hand-Rearing Facility, marsupials remain the greatest conundrum. Unless it has already spent considerable time in the mother's pouch, a marsupial infant is almost embryonic. In addition, the milk of marsupials is unlike that of any placental mammal. There have only been a few successful marsupial hand-rearings at the National Zoo, but each one adds to the knowledge of their needs. In time, the experience of zoos may make the hand-raising of marsupials and rodents as routine as carnivore rearing.

The National Zoo's Hand-Rearing Facility is under the direction of NZP Nutritionist Olav Oftedal who has conducted extensive research on mammalian milk and prescribes the formulas and diets for hand-reared animals. Jo Anne Grumm, of the FONZ Office of Volunteer and Educational Services, recruits and trains volunteers and shares in the day-to-day work of running the operation, which is closed to visitors. Hand-Rearing volunteers are carefully screened to make sure they understand the commitment they are making. This is no casual playtime with animal babies: The day shift is 11 hours; evening and night shifts are seven hours. Volunteers work three shifts a week for two weeks, then are off for two weeks, although schedules will depend on the demand at any given time. The long shifts are necessary because infant animals do best when they are handled by only a few experienced people.

Most of the training takes place on the job. There are so many different kinds of infants that no one set of procedures, other than the constant need for cleanliness and precision, can apply to all. Some infants must be bottle-fed. Some need tube feeding because they nurse so eagerly that they may inhale the milk. Some have sharp teeth or hooves and may be surprisingly strong for their size. Some may need very frequent feedings or medication or care in an incubator. No two are alike, even if they are members of the same species, except in one respect—they all create a good deal of cleaning work!

What are the favorites? Red panda cubs, with their white, "tear-streaked" faces; white-cheeked gibbon infants, gnome-like with white fur and black faces; and even intelligent, responsive young bats, which are "really sweet" in the words of one volunteer.

Although hand-reared animals must not become attached to humans, the volunteers cannot help but feel an interest in these youngsters and can recite the history of each one. They watch with pride as a young gazelle or bush dog or maned wolf is returned to its own species' social group, able to live a healthy life and, in good time, to rear its own young normally. □

ZooFari

FONZ's annual benefit galas have paved the way to Washington for a parade of exotic creatures.

From terns to timber wolves, the wildlife of Canada will be celebrated at FONZ's 1987 ZooFari Gala, to be held on Friday, May 29. Featuring live entertainment, animal demonstrations, silent and live auctions, cocktails, dinner, and dancing beneath the stars, ZooFari is an annual event to benefit the Theodore H. Reed Animal Acquisition Fund.

Named in honor of former National Zoo Director Theodore H. Reed, the Fund helps the National Zoo acquire, exhibit, breed, and preserve rare and endangered animal species. The first ZooFari, held in 1984, featured the wildlife of Africa; in 1985, the theme was Asian wildlife; and last year, ZooFari spotlighted the lush life of tropical Brazil.

Bringing together National Zoo supporters, Washingtonians, and celebrities for annual "wild" evenings, FONZ's three ZooFari benefits have raised almost $100,000 toward the support of the Animal Acquisition Fund, and thus paved the way to Washington for a parade of exotic creatures, great and small. First over the threshold was "Pandu," the male Indian rhinoceros on loan from the San Diego Zoo, whose costly cross-country tractor-trailer journey was made possible by the Fund. The purchase of two Asian small-clawed otters followed. A male Malayan tapir and four giant squirrels were also acquired from the T.H. Reed Fund.

ZooFari also helped support the Zoo's participation in the international Guam Bird Rescue Project. (Threatened with extinction by brown snakes introduced into their native island home, Guam rails and Micronesian kingfishers are being bred in captivity at the Zoo's Conservation and Research Center in Front Royal, Virginia.)

Most recently, the Animal Acquisition Fund partially underwrote a National Zoo expedition to the Malaysian state of Sabah, where Mammal Curator Edwin Gould and William Xanten, Collections Manager for the Central Mammal Unit, collected a variety of unusual small mammals that are not in any other U.S. zoo—long-nosed, common, and lesser tree shrews, Low's and earspot squirrels, and the intriguingly-named moon rats.

Something for everyone has come to the Zoo via ZooFari. On the Zoo's wish list for future acquisition are giant Indo-Pacific cuttlefish, giant isopods, and perhaps even the return of the Komodo dragons (see *ZooGoer*, July-August 1986).

Better than ever, the 1987 Canadian ZooFari will include the 15-piece Royal Canadian Regimental Band, bagpipers on parade, and plenty of native North American wild life!

ZooFari tickets are $125 a person, tax deductible. For more information or to receive a ZooFari invitation, call 673-4950.

An Indian rhinoceros and two Asian small-clawed otters came to NZP with help from ZooFari. (Photos by Jessie Cohen, NZP Graphics)

A Tale of Elephant Orthodontia

How fast action from NZP staff cured a five-ton toothache.

Kathy Wallace
Photos by Jessie Cohen, NZP Graphics

The test of any institution's mettle is the way it responds to a crisis. Here in the crisis-ridden nation's capital, the Zoo seems a tranquil haven, where emergencies are thankfully few and far between. I am therefore particularly proud to say that our Zoo recently passed the crisis test with flying colors when Nancy, our only African elephant, broke one of her two impressive tusks and urgently needed orthodontia.

What do you do when a five-ton elephant gets a toothache? The question sounds like a riddle, although the reality is far from a joke. To preface the chronicle of how various Zoo units—from welders to vets—quickly came together to repair the 32-year-old elephant's tusk, a little background on elephant management is needed.

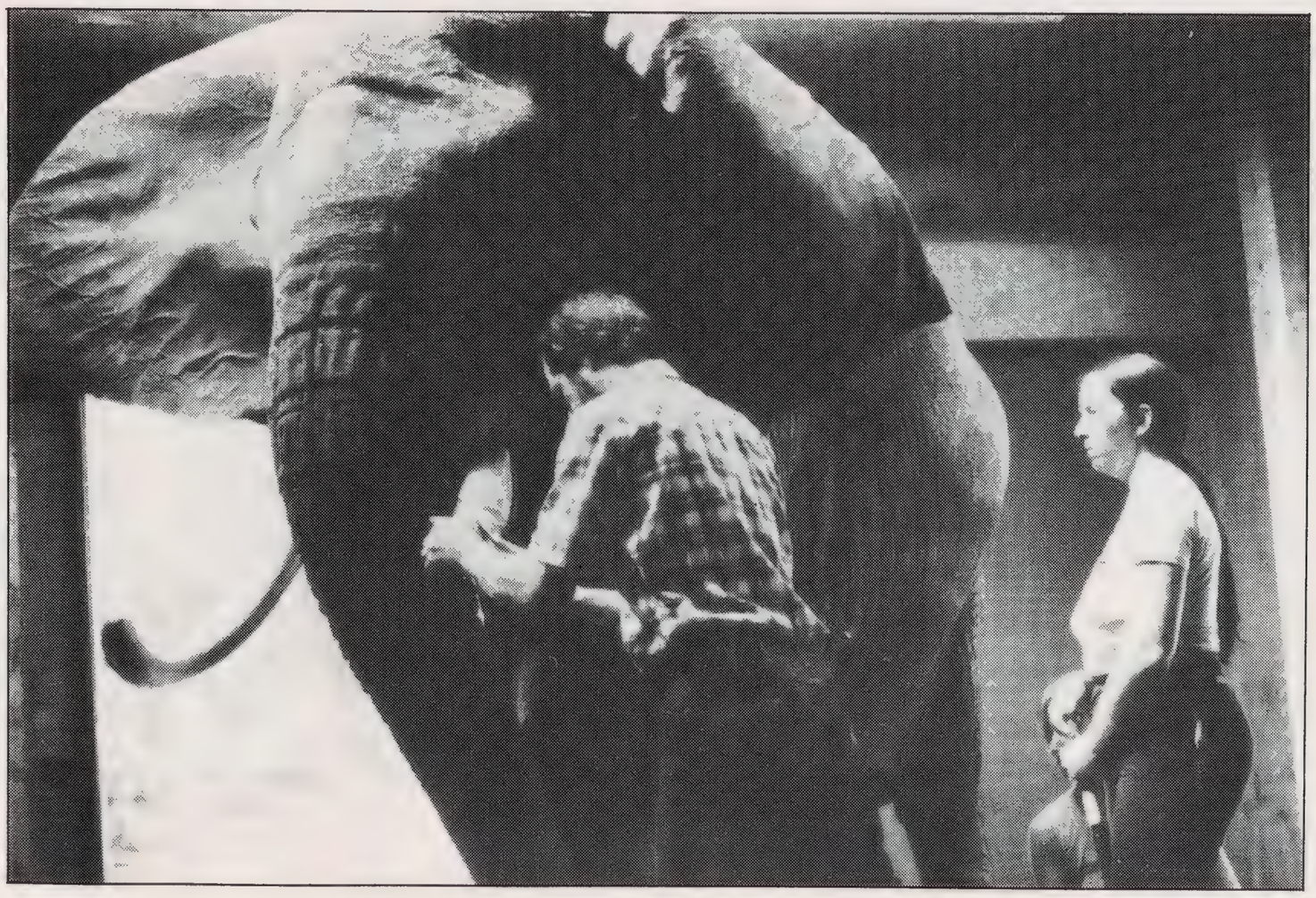
As anyone who has watched Zoo elephant training will remember, our keeper team uses this daily session to exercise, bathe, and provide foot and health care to our three female elephants—routines which both stimulate the animals and help the keepers safely control them by forming a close social bond with their charges. Highly intelligent animals, elephants are quick to learn and obey the rules, provided that those rules remain consistent and the keepers treat the animals fairly, never asking the animal to do something it perceives to be harmful or frightening. Thus a handler working with elephants must be constantly alert for any distractions—from a small chipmunk scampering across the yard to a large truck driving by hundreds of feet away—that might disrupt an animal's attention or sense of security.

On the morning of March 24, 1986, a forklift was being operated near the African elephant yard. Now, Nancy, who is nine and a half feet tall and weighs 9,800 pounds, is highly territorial and will become very aggressive toward any large (i.e. elephant-sized) machinery she sees working near her yard. In this case, Nancy first threatened the potential intruder by trumpeting and raising her head, ears flared. When these displays proved ineffective, she threw rocks toward the offending machine. When the forklift finally finished its business and started to leave, it seemed Nancy's sense of honor was still unavenged. Enraged, she hit the thing nearest to her, ramming the tip of her left tusk into a large wooden post and breaking off more than half the tusk.

The break was relatively even, but the impact had caused the remaining portion of the tusk to sustain a long crack extending upwards at a 45 degree angle and possibly crossing the path of the tusk pulp (the root of the tooth) and exposing it to infection. Before the fracture, Nancy's left tusk measured three and a half feet. The portion lost was almost two feet long and weighed six and a quarter pounds!

Zoo veterinarians Mitchell Bush, Lyndsay Phillips, and Roberta Wallace were concerned that if the upper half of the cracked tusk was not clamped together with the stronger lower portion, more of the tusk would break off and the tusk root might become infected. Such an infection could travel up the canal into the large sinuses and might ultimately result in meningitis and even death. A root canal operation was an almost equally unattractive possibility as it is both difficult and dangerous to anesthetize an elephant. (Unlike most mammals, an elephant's lungs are directly connected to its ribcage; a sedated elephant could literally suffocate itself because of the great weight pressing on its lungs. In decades past, many zoo elephants died under sedation for routine procedures, before the benefits of elephant training were realized.)

Thanks to Nancy's history of training and daily workouts, the Zoo staff was able to repair her tusk safely and with her cooperation. The initial bracing process, which took an hour and a half, was performed by keeper Morna Holden and me, under the guidance and instruction of the vets. Welding shop foreman Billy Turner devised



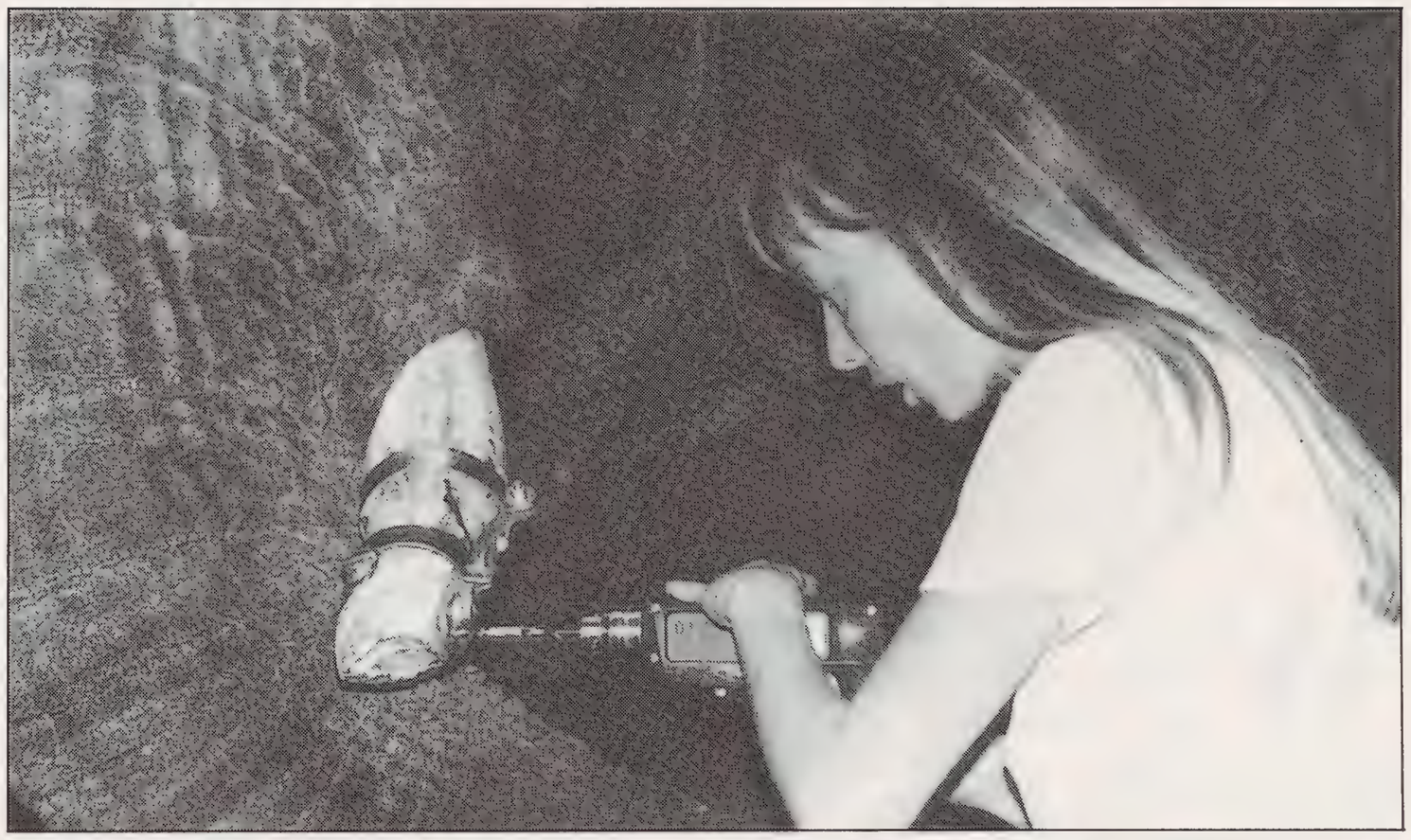
Kathy Wallace is an elephant keeper at the National Zoo.

two stainless steel bands that we first fitted and formed onto the tusk, then tightened down with bolts to compress the crack. Finally, to ensure that the bands would not slide off, we drilled three holes into the ivory below each band and inserted set-bolts.

Some adjustments were made over the next few months before pipefitting shop foreman John Novotny fashioned a less bulky version from a stainless steel retention band, often used to connect large pipes or hoses. By this point in the course of her check-ups and treatments, Nancy had become quite amenable to sharing her enclosure with any number of veterinarians, shop personnel, and keepers. Since small treats and bits of favorite fruit were always forthcoming to keep her standing still, she probably enjoyed all the attention!

Once the new type of band had proved effective, the old "braces" were replaced, and the set-bolt holes were cleaned and filled. Almost like a human dentist, Dr. Phillips cleaned out the holes, filling them with the same cavity-preventing materials used for human teeth.

Since the tusk of an elephant Nancy's age grows only a few inches a year, we don't expect that the broken one will ever grow to match the whole tusk. But, to everyone's relief, we discovered that the root of the broken tusk would not be in danger of infection, when, in early October, Nancy broke off both bands and the upper portion of left tusk. Unlike the first break, the second was not the result of aggression: Apparently Nancy was rubbing against a steel gatepost to try to smooth down the slight bump of the band on her tusk. When she felt the rattling of the bands and the upper half of the tusk, she simply removed them with a twist of her head. No exposed tusk root could be seen, so if no more cracking or breaking occurs, Nancy will need no further orthodontia. □



Thanks to daily training, African elephant Nancy allowed a diverse team of Zoo experts to tend to her broken tusk. Right: Keeper Kathy Wallace (top) and welding shop foreman Billy Turner (center) drill holes into the ivory; below, Wallace tightens the bands of Nancy's "braces." Left: Keeper Morna Holden watches as Zoo vet Lyndsay Phillips files down the rough edges.

Beavers in America: Dam-Nation!

Susan Lumpkin

When Europeans arrived to settle North America, 60 million beavers lived in the continent's pristine forests, on millions of placid ponds of their own creation. But a few short centuries later, beavers had become virtually extinct east of the Mississippi River, and by the end of the 19th century, few remained to the west. In keeping with its mission to display the nation's vanishing wildlife, the newly established National Zoo in 1894 mounted a concerted campaign to find and exhibit a colony of beavers for the public. Ten beavers were finally trapped for the Zoo—in Yellowstone National Park, some 2000 miles away.

Now, almost 100 years after beavers first came to the Park, the National Zoo is opening a new beaver exhibit in—where else—Beaver Valley. This time its inhabitants are not forlorn living relics. Wild beavers again abound in North American woodlands and waterways—including Washington's Rock Creek—just as they did long before anyone dreamed of needing a zoo to display disappearing native species.

Why, then, a beaver exhibit at the National Zoo, when these wild animals practically live in our backyards? For one thing, while almost everyone knows what a beaver looks like, people rarely spot one in the wild, thanks to the animal's secretive lifestyle and nocturnal habits. For another, the beaver is a living reminder that strenuous conservation efforts can save a species from extinction. And finally, the beaver merits a prominent place in our National Zoo because of its profound impact on our country's history.

Persecution of beavers did not begin in America. England hunted its beavers to extinction by the 12th century and their numbers were depleted in most of continental Europe by the time settlers began coming to North America. Why this relentless exploitation of a creature that is, after all, only a big, harmless rodent? Simply put, the beaver contained in one package three human essentials: food, medicine, and warm clothing.

Europeans of the Middle Ages savored a good roast of beaver. People considered the scaly flesh of the beaver's tail a particular delicacy, and, perhaps more important, they could enjoy the tail flesh on fast days when eating meat was forbidden: Officials of the Catholic Church had conveniently decreed that the tail of the beaver was fish.

Along with meat and "fish," beavers produced castoreum, one of the most highly-touted (and most expensive) of all medicines until modern times. This pungent, oily secretion of the beaver's anal scent gland was prescribed for all manner of illnesses and was probably even successful in treating some of them. Castoreum contains salacyclic acid—the major ingredient in aspirin—which the beaver obtains from eating willow bark.

The beaver's value as a provider of food and medicine, however, paled in comparison to its value as a bearer of fur. The dense, glossy, luxuriant fur that had evolved as an adaptation to the beaver's life in cold aquatic habitats also made warm coats and capes and caps—items that the rich, at least, found essential to life in chilly European climates.

With European demand for beaver fur high and the supply low, the discovery of beaver—a bonanza of beaver—in America was like the discovery of gold in California or oil in Texas. Beaver were so ruthlessly hunted that as early as the 1630s they were scarce or locally extinct in parts of the northeast. Demand continued unabated however, and for the next 200 years, beaver was the most sought after natural resource in North America, inspiring much of the continent's early exploration and making at least a few Americans very rich. (One of this country's greatest fortunes was built on the backs of beaver: John Jacob Astor, whose American Fur Company monopolized the fur trade in the United States, died in 1848 with the distinction of being the wealthiest man in the country.)

By the end of the 19th century, with beaver and other furbearing animals nearly extinct, and with the rise of other industries, the fur trade had lost its economic pre-eminence. At the same time, the widespread loss of native wildlife species belatedly became a matter of public concern. A rational policy of wildlife management for sustained yield gradually replaced the senseless mania of total slaughter for fast short-term gain. Remaining beaver populations responded to protection and management and began to recover in the early years of this century. Later, in the 1950s, reintroduction programs restored beaver populations to much of their original North American range.

Beavers are creatures of distinction. Able to spend up to 15 minutes submerged before surfacing for air, they are the world's most aquatic rodent—and, weighing up to 65 pounds, the second largest (after the capybara). They are unrivaled among mammals in their unique combination of intriguing physical, behavioral, and social adaptations. And they are rivaled only by man in their capacity for construction.

The beaver looks like a mythical hybrid of aquatic vertebrates: The body is streamlined like a seal's, the hind feet are webbed like a duck's, and the scaly flat tail is definitely reminiscent of a fish. When a beaver dives, its nose and ears close and translucent membranes cover its eyes; so the animal doesn't choke while carrying or gnawing logs underwater, it blocks its throat with the

back of its tongue and closes its lips *behind* the huge orange incisors. Yet all these features that make a beaver's life in the water so easy have one drawback: They make the animals slow and clumsy—and easy prey—on land. To get around this problem, beavers evolved the remarkable architectural ability to replace land with navigable water.

Among the beaver's various water projects, canals are the simplest, usually built to connect two ponds or feeding areas. Using the mobile fingers of their forepaws, beavers dig up mud from the bottoms of shallow streams or ponds and push it to the side. They dig and push until the water in the canal is deep enough for them to swim rather than waddle from pond to pond or from pond to feeding area.

The ponds themselves, of course, are formed by the dams that beavers are famous for building. Stimulated by the sound of running water, beavers carefully pile mud, stones, sticks, and branches across streams until the fast flow of water is reduced to a trickle and a pond forms upstream. The dams are constantly reinforced, repaired, and modified to regulate the water level in the pond, which must be deep enough to accommodate an underwater lodge entrance and a submerged store of winter food—and deep enough for a beaver to take a dive when pursued by a hungry carnivore.

A lodge usually begins as a burrow dug into the stream bank, with an underwater entrance. As the water in the pond rises, the beavers extend the burrow upwards and, when it breaks the ground, they cover the opening with sticks, branches, and mud, much as they build dams. At the same time they hollow out a roomy living chamber. If the lodge becomes an "island" in the pond, which often happens as water levels rise, the lodge is built up so the living chamber is always above water and dry. The entrance, however, is always underwater; this prevents most predators from entering to dine on baby beavers.

Ironically, these architectural safeguards make beavers easy prey for human predators: Traps set around a beaver-dammed pond are bound to snare animals driven from their lodge by the trapper. And the lodge almost always shelters a whole family of beavers—four or five or more.

Smithsonian Institution

One of the National Zoo's first exhibits was this beaver-built dam.

Jessie Cohen, NZP Graphics

NZP staffers Demetrio Marciano (left) and Plummer Whitehead (right) were kept busy as beavers constructing the new exhibit.

Jessie Cohen, NCP Graphics

Near the brink of extinction at the turn of the century, the beaver's return to America's waterways is a true conservation success story.

Beaver family life seems as peaceful as the ponds on which they live.

Beaver family members, always amiable among themselves, do not tolerate outsiders in their midst and never join other families to form larger social groups. A monogamously mated male and female head the beaver household. The female bears one litter of kits, usually three or four, each year. Kits are born well-developed—they swim within hours—and grow rapidly, but, needing time to master the construction business, young stay with their parents up to two years or more. A typical established family thus consists of the adult pair, their young of the year, yearlings between one and two years old, and occasionally a sub-adult older than two, who may be taking a respite from attempts to find a mate.

All family members except young kits work on canal, dam, and lodge construction; females, especially the adult breeding female, are the most active builders of dams and lodges. The adult male, on the other hand, provisions young with most of the solid food they receive before their emergence from the lodge at about six weeks old; he also scent marks the family territory more frequently than the other members.

The adult female dominates her mate (as well as their young) and this seems to be essential to the beavers' reproductive success. Experience with beavers in captivity has shown that if a female doesn't quickly establish dominance over a potential mate—often through violent fights—a long-term bond will not occur.

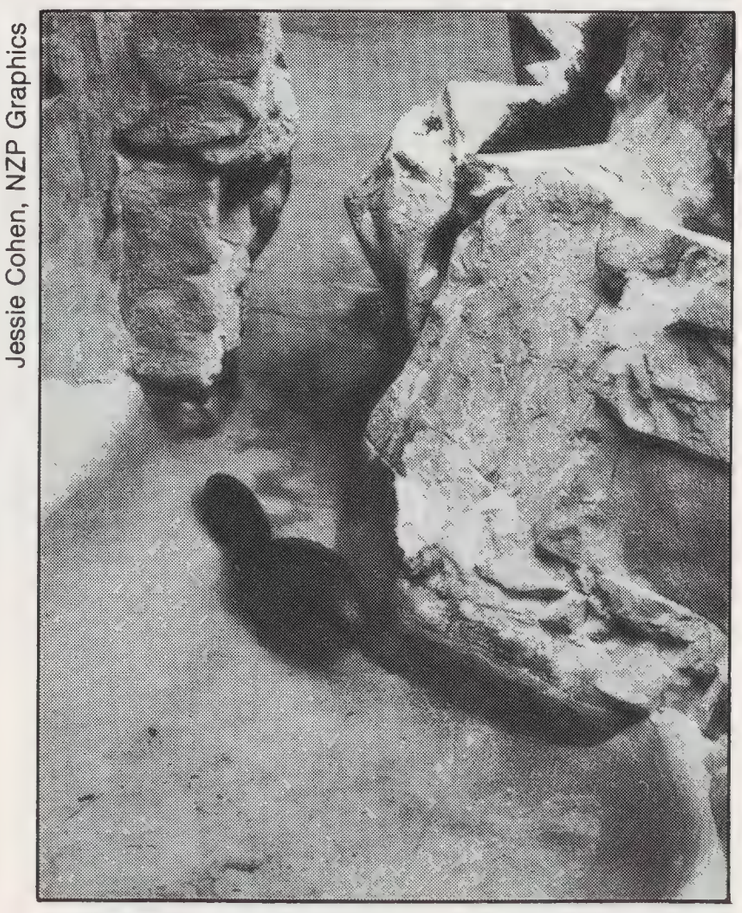
Once paired, however, a male and female may spend 10 or 15 harmonious years together. Lars Willson, who studied European beavers, described the relationship between mated male and female: "... there is never any trace of discord.... They sleep curled up close together during the daytime, and at night they seek each other out at regular intervals to groom one another or just simply to sit close side by side and 'talk' for a little while in special contact sounds, the tones and nuances of which seem to a human expressive of nothing but intimacy and affection." Beaver family life seems as peaceful as the ponds on which they live.

Unfortunately, no happy beaver family has made a home at the National Zoo in a long time, and none has ever produced young. To change this dismal record, a new beaver exhibit was constructed last year and hope abounds that our beaver pair—who have lived together over 18 months—will give the exhibit their stamp of approval by raising a family there.

Zoo staff built into the new exhibit all the beaver essentials: dam, lodge, pond, and islanded feeding area, each designed to duplicate as much as possible natural beaver-built structures. A natural beaver lodge, for instance, is very well insulated against both cold and heat. As a result, the temperature in the living chamber fluctuates little from day to day and changes only slowly with seasonal shifts in weather. The new man-made lodge is similarly well insulated and incorporates fans, heaters, and sprinklers to regulate the temperature in the chamber.

The living chamber in a beaver lodge is absolutely private so, to preserve the beaver's peace of mind, the new exhibit does not have a window into the lodge. But don't despair! Zoogoers will still be able to watch the beavers lounging in their lodge via a video-camera connected to closed circuit television. Not the same, you say, as a beaver "in the fur?" Look again—in the pond or on the feeding island. For the past year, keeper Vince Rico has been adjusting the beaver pair's feeding schedule so the animals are more active outside during the day. Like most zoo animals, they tend to avoid the mid-day crowds, preferring to be out and about in the early morning and late afternoon.

Jessie Cohen, NZP Graphics



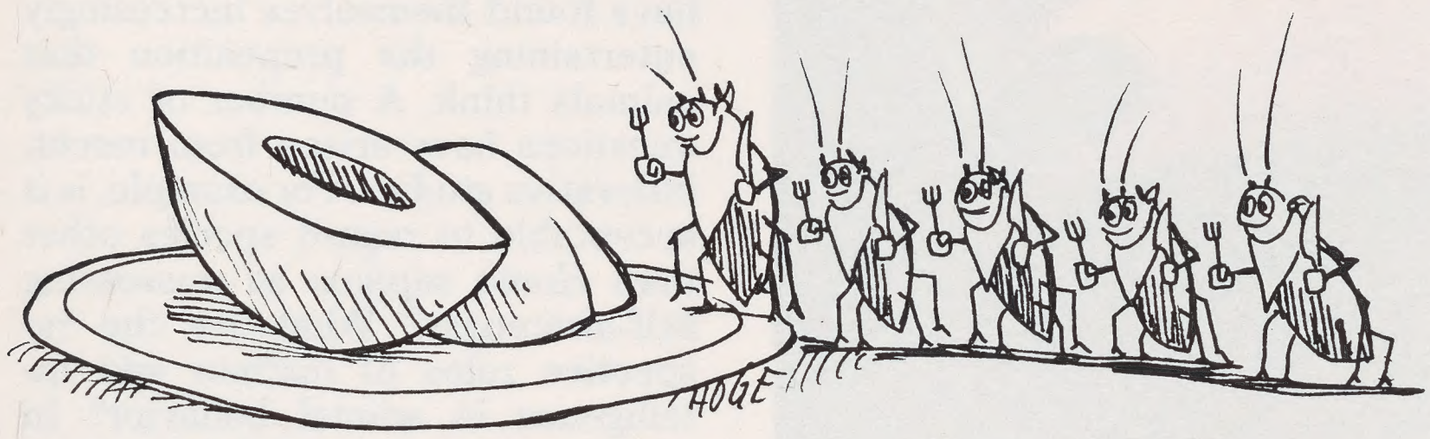
Early mornings and late afternoons are the best times to see the Zoo's beaver pair outside their lodge.

Browse trees—small softwoods—are also important to the well-being of beavers, so a plantation of poplars covers the hillside behind the new exhibit. In the wild, beavers gnaw down trees with their strong incisors and carry or float the branches to a safe feeding area. The bark is food for the beavers, who strip it with their teeth while rotating the branch in their hands much as we eat corn-on-the-cob; the bare branches then become building material. With 2000 poplars eventually to be planted, our beavers will not want for bark to eat, nor for branches with which to add a "personal" touch to their man-made lodge and dam.

Finally, the beavers will share their habitat with other species familiar from the wild. When beavers dam a stream and create a pond they make a home not only for themselves, but also for many other plants and animals that require serene watery settings. In the wild, marsh plants like cat-tails rim beaver ponds, as they do here. Night herons wade in the shallows; wood ducks and mergansers glide on the pond's surface; turtles paddle between water and land; and frogs wait until dark to croak for mates—as they do here. A beaver pond teems with life, and the new beaver exhibit reflects this—showing us how much wildlife was saved when the beavers were. □

Keepers' Corner

True Tales from Zoo Insiders



Nowadays, the Zoo has a plentiful supply of live crickets to feed its insectivores, but this wasn't always the case. Twenty-five years ago, NZP Director Ted Reed entered the Small Mammal House with a group of visiting zoologists and saw me placing a dish of peaches and cottage cheese in with the insect-eating short-tailed shrews. The zoologists politely ignored the unusual meal, but after they left, Dr. Reed called me aside.

"Don't you know those animals are insectivores?" he said.

"Yes, sir," I replied.

"Then why," he asked, "are you feeding them peaches and cottage cheese?"

"Peaches?" I replied in all innocence. "Why, no, sir, I'm feeding them insects. The peaches and cottage cheese attracts bugs and the shrews get live insects for their dinner."

Give or take a few missing links, even in captivity, the food chain rattles on.

—Eugene Maliniak
Retired Keeper

The bestiaries of medieval times were filled with "eyewitness" accounts of such mythical creatures as unicorns and serpentine, smoke-breathing dragons. Somehow or another, few of these magical marvels made it off the ark and into the modern zoo . . . but it seems that deep down, some of us still hold out hopes of discovering a secret something-or-other—especially when we've seen the evidence with our own eyes.

Now, the black-and-white colobus monkeys are among the more striking residents of the Monkey House. These arboreal primates are outfitted with magnificent long tails that end in a burst of luxuriant white fur.

One day, a visitor came up to me with a serious but puzzled look on her face. "Just what kind of monkey is that with two tails?" she murmured. When she pointed out the two-tailed wonder, my hopes for a Dr. Doolittle discovery were dashed. That, I informed the lady, was a mother. The extra tail was attached to your basic model colobus infant, snuggled closely against its mother's belly, I explained.

We went our separate ways, laughing, but perhaps just a tad let down. . . . And with that, another tall "tail" bit the dust.

—Melba Brown
Monkey House Keeper

During warm weather, an American alligator and several native turtles peacefully coexist in a pond in front of the Reptile House . . . most of the time. One day last summer, a keeper came out and tossed the alligator its weekly meal of two dead rats. The alligator caught one rat and missed the other. An enterprising turtle quickly swam by and snatched the rat from under the alligator's nose. Angrily swishing its tail and snapping at everything in sight, the alligator gave chase.

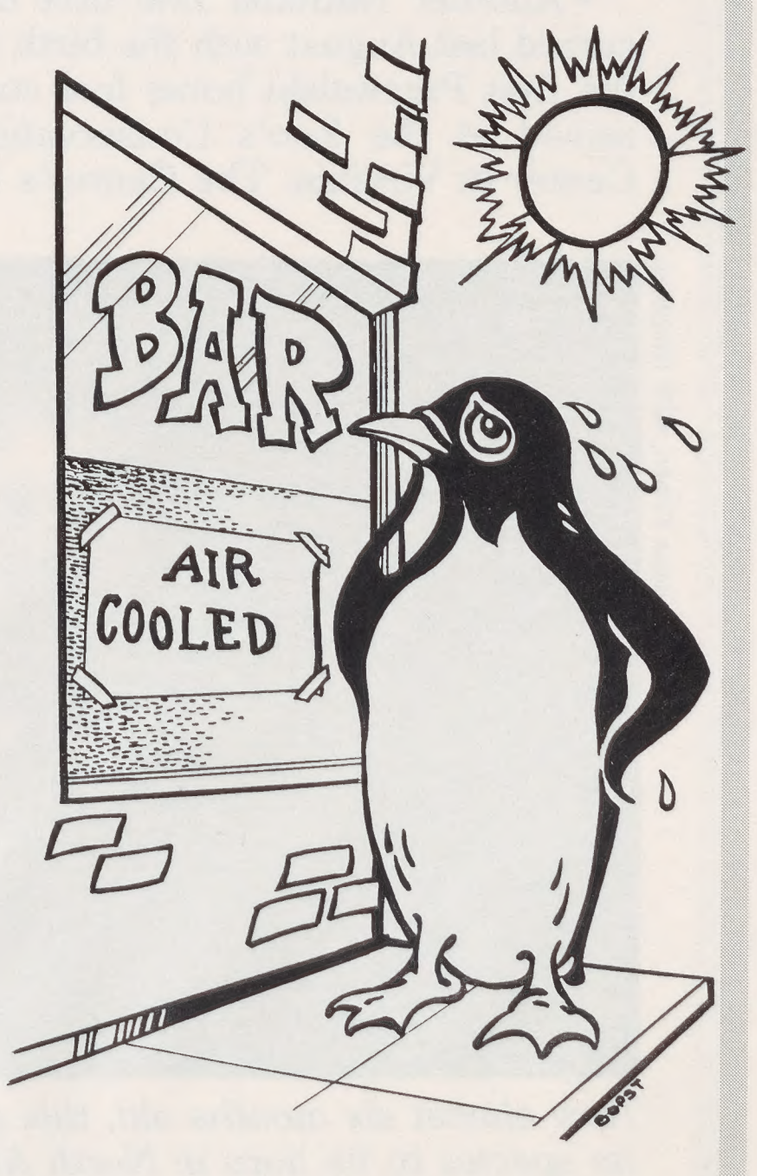
About half an hour later, the alligator found the culprit and reclaimed his rat. The strange thing is that the turtle couldn't have eaten the rat anyway—it wouldn't be able to break the skin—so it all seemed to me to be something like their idea of fun. The alligator is too small to eat these large turtles, but some of them have teethmarks on their shells nonetheless. Perhaps this incident helps explain why.

—Joyce Wilde
Reptile House Guide

Twenty-five years ago, just about the only air conditioned spots in Washington were movie theaters and bars, which did a thriving business during the hottest summer days. Of course, the Zoo's Arctic penguins summered in air conditioned enclosures, but the Humboldt penguins, a hardy species native to Peru, lived year-round in an outdoor enclosure with a pool. On a particularly warm July afternoon in the late 1950s, one Humboldt slipped out unseen and ventured into the wider world beyond. His absence was soon noted and, in hot (and I *do* mean hot!) pursuit, we trailed him out of the Zoo gates and up the busy Connecticut Avenue sidewalk. At last, panting and perspiring, we found him in the cool lobby of the Uptown Theater. It must have been the air conditioning that attracted him there, but I've never been sure how he knew about it.

If only someone had asked me, "What's that penguin doing at the theater?" I was ready to reply, with a straight face, "Oh, he's a teetotaller."

—Theodore Reed
Retired Director



Jessie Cohen, NZP Graphics

The Toco toucan is a recent arrival at the Bird House.

NEW AT THE ZOO

Among the Zoo's newest special attractions are the first golden-headed lion tamarins ever born in the U.S.—one born at NZP last August and twins born this December—on exhibit with their parents in the Small Mammal House; a spectacled owl and a Toco toucan in the Bird House; several new Malaysian species (see "ZooFari," p. 15) in the Small Mammal House; and the first spider monkey born at NZP's Monkey House in three years.

• Another National Zoo first occurred last August with the birth of the first Przewalski horse foal conceived at the Zoo's Conservation Center in Virginia. The Center's 12 Przewalski horses came to Virginia from the San Diego, Brookfield, Minnesota, Bronx, and Denver Zoos as part of a cooperative Species Survival Plan breeding program.

• Mixed exhibits—different species sharing the same enclosure—are adding new interest for the Zoo's animals as well as for its visitors. Some recently matched exhibitmates in the Small Mammal House are degus with prehensile-tailed porcupines and Bali mynahs with a variety of squirrels and tree shrews. In the Reptile House, crocodilians share an enclosure with snakehead fish and Anna's hummingbirds. The Deer Area features two new mixed exhibits: white-naped cranes with Pere David's deer, and a triple-mix—Malaysian tapirs, Burmese brow-antlered deer, and Reeve's muntjacs.

Jessie Cohen, NZP Graphics

Now almost six months old, this golden-headed lion tamarin was the first of its species to be born in North America.

ANIMAL INTELLIGENCE

Scientists studying animal behavior have found themselves increasingly entertaining the proposition that animals think. A number of sticky questions have arisen from recent, innovative studies. For example, is it acceptable to regard species other than *Homo sapiens* as possessing self-awareness? What are the respective roles of instinct and intelligence in animal behavior? In what ways are animals' abilities comparable to our own? And why will such knowledge prove useful to humankind?

These and many other provocative questions are explored and many wondrously inventive creatures encountered in the pages of *Animal Intelligence: Insights into the Animal Mind.*

Richard Swartz, courtesy Smithsonian Press

Drawn from presentations by a variety of animal behavior experts at the National Zoo's second award-winning Symposium for the Public, *Animal Intelligence* is now available at the Bookstore Gallery in the Zoo's Education Building.

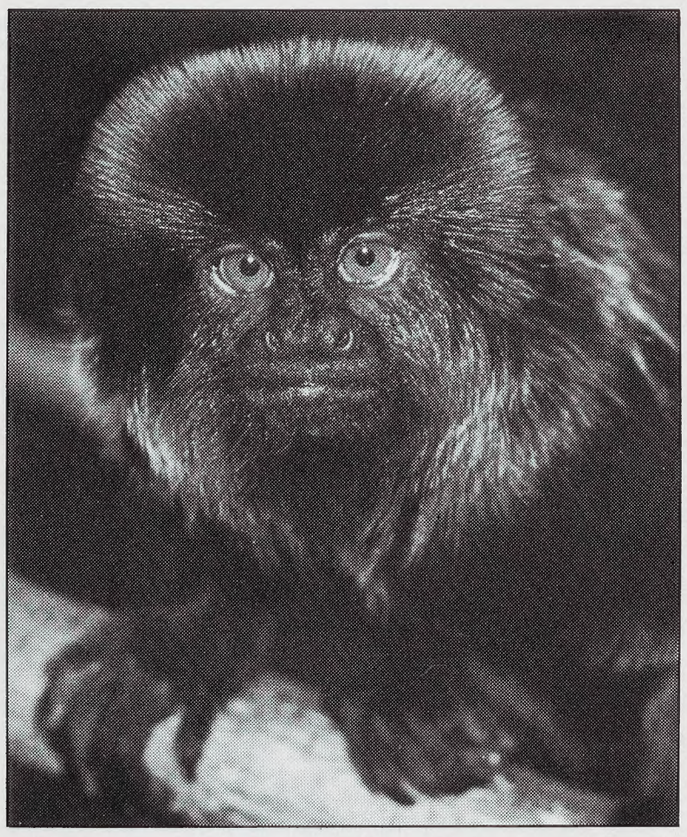
VOLUNTEERS WANTED

Do you secretly wish . . . to make breakfast for a marmoset? Deliver dinner to a dik-dik? Clean house for a clouded leopard? Can you picture yourself climbing snowy country hillsides, tracking down a herd of hardy Przewalski's horses?

If you harbor secret yearnings for the zoo keeper's life, you've finally got your chance: The National Zoo's Conservation and Research Center in Front Royal, Virginia, is looking for a few good volunteers to work with their mammal collection. Trained by CRC's career keeper staff, keeper-volunteers work closely with professionals, getting unique hands-on experience in a number of areas.

Volunteers are also needed to assist CRC researchers in wildlife studies, including research on free-ranging white-tailed deer and star-nosed moles. A variety of projects, including radio-tracking, computer work, and close-up observation make these volunteer opportunities particularly valuable for anyone interested in the field of wildlife management. Conservation Center keeper-volunteers work a minimum of three days a week for three months; research volunteers work full time for three months and must have a driver's license. Free housing in the Front Royal facility's dormitory is available to both keeper and research volunteers. For more information, call JoAnne Grumm at 673-4956 or call the Conservation Center at (703) 635-4166.

Jessie Cohen, NZP Graphics



Helping Conservation Center keepers care for marmosets is just one of many jobs available to volunteers.

In Washington, the National Zoo is looking for volunteers to assist Zoo staff in everything from carpentry to computer programming. FONZ is currently seeking tour guides, as well as weekend volunteers to collect "browse"—the tree limbs and branches that supplement the diet of the Zoo's monkeys and apes.

Find out more about these and other Zoo volunteer opportunities at FONZ's Volunteer Job Fair, to be held this winter. Call 673-4955 for information about the Fair date and time.

Milton Tierney

"Mimi," the Zoo's female spectacled bear, is the mother of four offspring.

LETTERS

Dear *ZooGoer,*

There was an error in your spectacled bear birth announcement. The twins born last winter represent the *third* successful breeding of spectacled bears at the National Zoo, not the *second*! The birth you forgot was the first, a male cub named "Paco" who was born in December 1981 and is now on loan to the East Berlin Zoo. He may be behind the "Iron Curtain," but he's certainly not forgotten by those of us who worked with him.

Morna M. Holden
NZP Keeper

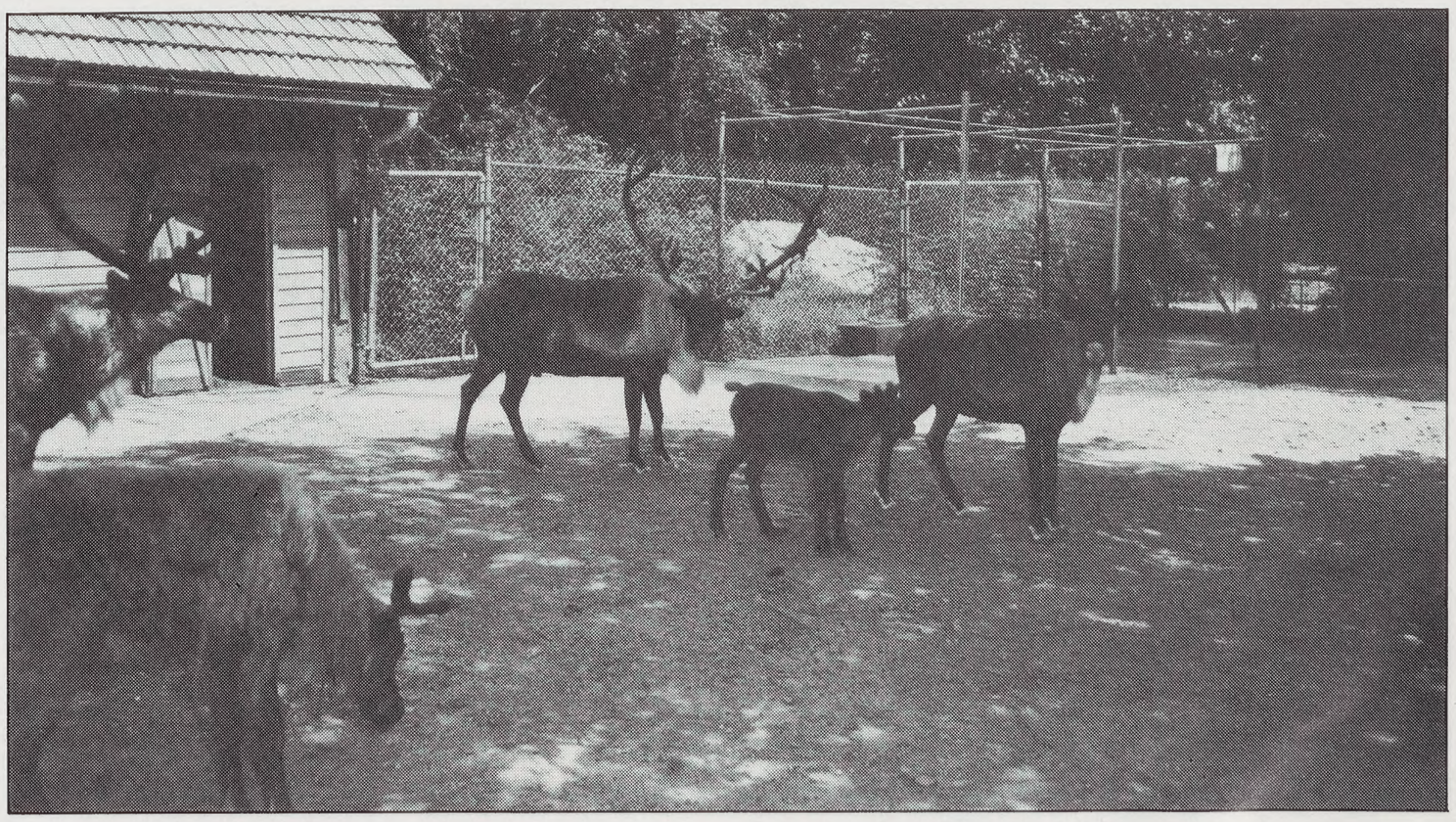
Dear *ZooGoer,*

What animals used to be on exhibit in the area where the Education Building is today?

Jerry C. Harris
Leesburg, Va.

According to NZP Historian Billie Hamlet, American bison and later reindeer were kept in the area where the Zoo's Education Building now stands.

Smithsonian Institution



Years ago, reindeer graced the current site of the Education Building.

ZooFari '87 celebrates Canada's wildlife (p. 15)

Friends of the National Zoo
National Zoological Park
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